

BIG EAST LAKE



Introduction

Big East Lake is south of Utah Valley, between Loafer Mountain and Mount Nebo. It is the largest of the Payson

Lakes, a group of about a half-dozen lakes in the Payson Canyon drainage. Some, including Big East, have been

regulated with dams so their water can be used for agricultural purposes. The area is a popular summer recreational area for residents of Utah Valley, as it is close to the cities, with a cool, pleasant climate. This particular lake has a large, staffed campground and other developed facilities. The lake was enlarged with the construction of

Characteristics and Morphometry

Lake elevation (meters / feet)	2,399 / 7,870
Surface area (hectares / acres)	9.3 / 23
Watershed area (hectares / acres)	
Volume (m ³ / acre-feet)	
capacity	826,446 m ³ / 670
conservation pool	1.604 x 10 ⁶ / 1,300
Annual inflow (m ³ / acre-feet)	not measured
Retention time (years)	<1
Drawdown (m ³ / acre-feet)	not measured
Depth (meters / feet)	
maximum	
mean	8.8 m / 29
Length (meters / feet)	515 / 1690
Width (meters / feet)	257 / 845
Shoreline (km / feet)	1.25 / 4,092

Location

County	Utah
Longitude / Latitude	111 38 21 / 39 56 05
USGS Map	Payson Lakes, 1979
DeLorme's Utah Atlas & Gazetteer™	Page 45, B-6
Cataloging Unit	Utah Lake (16020202)

an earth-fill dam in 1898. The shoreline is 100% owned by the Uinta National Forest. Public accessibility is unrestricted. Water is consumed for irrigation, but also used for coldwater aquatic habitat and recreation. No changes in water use are expected.

Recreation

Big East Lake is accessible from the Nebo Loop

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Road,

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a paved Forest Service road. Exit I-15 in Payson (exit 154), go south to US-6, then east on 6 for about .5 miles to the Nebo Loop Road (there is a small sign). (There is an old brick school on a hill surrounded by large trees at the intersection.) Travel on the Nebo Loop Road for about 10 miles up Payson (Peteetneet) Canyon to the Payson Lakes Campground and Big East Lake. Parking areas are well marked. There is a walking path around the lake with commanding views of the surrounding.



Recreational facilities are well developed at the lake, and include lawns, flush toilets, and picnic areas. The water is generally cold for swimming. It is possible to get small boats on the lake, but motors are prohibited. Grazing cattle provide some hinderance to recreation, although this area is not nearly as heavily grazed as other areas in the Payson Lakes/Nebo Wilderness area. The road is not plowed during the winter, but is groomed for snowmobiles and cross-country skiers.

The nearby campground has over 70 sites, but it is usually full during summer weekends. Fees are charged (\$7) for camping, and the entrance gate is locked at 10:00 pm. Campsites can be reserved through Mistix.

There are complete services and a private

campground in Payson (see Info Box), and several other USFS campgrounds in Payson Canyon. Camping outside the lake campgrounds is permitted with several overflow areas close to the area.

Watershed Description

The lake has a very small watershed (500 acres), which, except for the diversion canal, is unmodified by direct human activity, but the vegetation communities have been greatly modified by the grazing of cattle. The watershed is primarily a spruce-fir forest with a few meadows. Bark beetles have killed many individual trees within the watershed.

The watershed high point, a point on the Nebo Loop Road 1.5 miles south of the lake, is 2,566 m (8,420 feet) above mean sea level, creating a complex slope of 6.8% to the lake. The inflow is a spring-fed diversion from Jones Ranch Creek. The outflow is a short, unnamed creek that joins Wimmer Ranch Creek. The average stream gradient above the lake (including the canal) is 3.4% (179 feet per mile).

The watershed is composed of gentle mountains. The soil is derived from fairly soft, recent (Oligocene) strata, leaving few rocky outcroppings. The soil associations that compose the watershed are listed in Appendix III.

The vegetation communities consist of aspen, oak, meadow grass and spruce-fir. The watershed receives 51 - 64 cm (20 - 25 inches) of precipitation annually. The frost-free season around the reservoir is 60 - 100 days per year.

Land use in the watershed is 30% intensive recreation and 70% multiple use.

Limnological Assessment

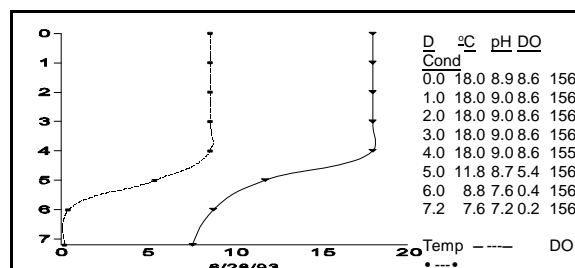
The water quality of Big East Reservoir (Payson Lake) is good. It is considered soft with a hardness concentration of approximately 69 mg/L. The water quality constituents analyzed that exceeded established State water quality standards for the reservoir were phosphorus, temperature, dissolved oxygen, and iron. The average concentration of total phosphorus in the water column during the productivity season exceeded the recommended level of 0.025 mg/L for all three study periods. Although the concentration at the surface 20, 34 and 26 ug/L averages just over the recommended level the concentration throughout the water column was well over the limit with an average of 47 ug/L. Temperature values are within the limits for a cold water fishery early in the year but late in the summer season temperatures throughout the water column rise to near the threshold value of 20 C° in the lake profiles for late summer. Dissolved oxygen concentrations declines in the water column to a point that exerts a stress on the fishery as

Limnological Data

Data sampled from STORET site: 591791

Surface Data	1980	1989	1991
Trophic Status	E	E	M
Chlorophyll TSI	-	54.17	44.79
Secchi Depth TSI	50.77	48.31	49.31
Phosphorous TSI	59.8	54.79	50.84
Average TSI	55.28	52.42	48.32
Chlorophyll <i>a</i> (ug/L)	-	11.05	4.25
Transparency (m)	1.9	2.25	2.1
Total Phosphorous (ug/L)	20	34	26
pH	8.5	8.8	8.5
Total Susp. Solids (mg/L)	5	-	3
Total Volatile Solids (mg/L)	-	-	4
Total Residual Solids (mg/L)	-	-	1.5
Temperature (°C / °f)	14/58	18/64	19/67
Conductivity (umhos.cm)	150	179	143
Water Column Data			
Ammonia (mg/L)	0.05	0.06	0.28
Nitrate/Nitrite (mg/L)	0.08	-	0.05
Hardness (mg/L)	70	-	67
Alkalinity (mg/L)	75	-	72.5
Silica (mg/L)	-	-	22.3
Total Phosphorus (ug/L)	30	43	69
Miscellaneous Data			
DO (Mg/l) at 75% depth	4.9	8.3	4.8
Stratification (m)	2-4	NO	NO
Limiting Nutrient	N	N	N
Depth at Deepest Site (m)	6	5.0	5.0

indicated in the June 28, 1993 profile. The only other constituents that violates standards is iron. Of five samples obtained only once did iron exceed the standard (1000 ug/L). It appears that the major water quality problem is the elevated levels of nutrients which lead to overproduction and a loss of dissolved oxygen due in part to the decomposition of organic matter from the increased algal production. Due to relatively low nitrogen/phosphorus rations the reservoir is classified as a nitrogen limited system. In 1981 and 1989 the reservoir was classified as an eutrophic reservoir. However, the data obtained in 1991 supports a mesotrophic classification. The reservoir has declined from a TSI index value of 55.28 (1981) to 48.41 (1991). This suggest that water quality is improving, but additional monitoring will be need to verify the trend. The reservoir was stratified in 1981 and stratification was evident in 1991 and 1993. Typically, macrophytes have posed no problems at Big East Lake.



The DWR stocks the pond annually with 8,000 catchable rainbow trout (*Oncorhynchus mykiss*) in the spring and 4,000 in the fall. Fingerling brook trout (*Salvelinus fontinalis*) are occasionally planted (5,000 in 1989 and 1991). The lake was chemically treated by the DWR in 1957, so populations of native fishes may not be present.

Phytoplankton in the euphotic zone include the following taxa (in order of dominance)

Species	Cell Volume (mm ³ /liter)	% Density By Volume
<i>Gloeotrichia echinulata</i>	889.600	98.30
<i>Sphaerocystis Schroeteri</i>	7.923	0.88
<i>Ceratium hirundinella</i>	5.618	0.62
<i>Anabaena flos-aquae</i>	0.845	0.09
<i>Aphanizomenon flos-aquae</i>	0.07	0.634
<i>Pandorina morum</i>	0.222	0.02
<i>Ankistrodesmus falcatus</i>	0.070	0.01
<i>Chroococcus dispersus</i>	0.056	0.01
<i>Asterionella formosa</i>	0.028	0.00
Pennate diatoms	0.013	0.00
Centric diatoms	0.010	0.00
Unknown chrysophyte	0.005	0.00
<i>Melosira granulata angustissima</i>	0.003	0.00
Total	903.497	
Shannon-Weaver [H']	0.11	
Species Evenness	0.04	
Species Richness	0.44	

The phytoplankton is dominated by the blue-green algae, *Gloeotrichia echinulata*. These types of algae are more indicative of eutrophic conditions.

Pollution Assessment

Nonpoint pollution sources include the following: Human waste, litter and chemicals from recreation, and sedimentation, nutrient loading and pathogens from grazing.

There are no point sources of pollution in the watershed.

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Beneficial Use Classification

The state beneficial use classifications include: boating and similar recreation (excluding swimming) (2B), cold water game fish and organisms in their food chain (3A) and agricultural uses (4).

The Payson City Corporation controls the water rights and uses the water for primarily for irrigation purposes.

Information

Management Agencies

Mountainlands Association of Governments	377-2262
Division of Wildlife Resources	538-4700
Division of Water Quality	538-6146
Payson City Corporation	

Recreation

Mountainland Travel Region (Vernal)	377-2262
Payson Chamber of Commerce	465-9288
Spanish Fork Chamber of Commerce	798-8352
L&J RV Park (Payson)	465-4761
Mistix	1-800-283-2267